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REMARKS

Claims 31-33 and 163-188 are pending in the Application.

Claims 31-33, 163-165, 170-171, 175-176 and 181-188 are cancelled without prejudice.

Claims 177-180 are allowed.

Claims 166, 167 and 172 are rejected.

Claims 168, 169, 173 and 174 are objected to.

I. REJECTIONS UNDER 35 U.S.C. § 102(b)

Examiner has rejected Claims 166, 167 and 172 under 35 U.S.C. § 102(b) as being anticipated by *Ando*, "Carbon Nanotubes at As-Grown Top Surface of Columnar Carbon Deposit", Japanese Journal of Applied Physics, Vol. 32, Part 2, No. 9B (Sept. 1993), pp. 1342-1345 ("*Ando*") or *Li, et al.*, "Large-Scale Synthesis of Aligned Carbon Nanotubes," Science, Vol. 274, December 6, 1996, pp. 1701-1703, ("*Li*") or *Thess, et al.*, "Crystalline Ropes of Metallic Carbon Nanotubes," Science, Vol. 273, July 26, 1996, pp. 483-487, ("*Thess*"). Paper No. 10, at 3.

Examiner makes reference to "Figure 5B of *Ando* for the disclosure of parallel carbon conductive nanotubes." *Li*'s "Figure 4 discloses the parallel oriented conductive nanotubes" and *Thess*'s "Figure 1. conductive nanotubes that are single walled and parallel to each other." Paper No. 10, at 3.

Examiner contends "It is inherent in the above articles that nanotubes are nanoporous because of the spacing between the tubes." Paper No. 10, at 3.

A. REJECTIONS UNDER 35 U.S.C. § 102(b) AS BEING ANTICIPATED BY *ANDO*

Anticipation requires each and every element of the claim to be found within the cited prior art reference.

Claims 166, 167 and 172 all refer to a membrane. The Applicant utilized this term in its ordinary and customary meaning that would be attributed to those words by persons skilled in

the relevant art of the Application. When an Applicant uses a term in its ordinary and customary meaning, it is well settled that dictionaries can be utilized to provide such ordinary and customary meaning. *See, e.g., Inverness Medical Switzerland GmbH v. Princeton Biomeditech Corp.* 309 F.3d 1365, 64 U.S.P.Q.2d 1926 (Fed. Cir. 2002) (citing *Webster's Dictionary* to determine the ordinary and customary meaning of the term “mobility”).

Webster's II New College Dictionary (1999) defines the ordinary and customary meaning of membrane (when used in chemistry) as: “A thin sheet of natural or synthetic material permeable to substances in solution.” (*Webster's* at p. 683, excerpts of which are attached hereto at **Exhibit A**). The Application utilizes the term membrane consistent with this definition. For instance, the Application states: “Arrays containing from 10^3 up to 10^{10} and more SWNT molecules in substantially parallel relationships can be used per se as a nanoporous conductive molecular membrane.” Application, at 35, *ll.* 29-30 and at 36, *ll.* 1.

Claims 166 and 167 refers to a membrane comprising an array of single-wall carbon nanotubes in substantially parallel relationship. Claim 172 refers to a membrane comprising carbon fibers that are aggregates of a plurality of single-wall carbon nanotubes, wherein the plurality of single-wall carbon nanotubes are in a generally parallel orientation.

With regard to Claim 166, first of all, *Ando* does not teach a membrane. Figure 5 and all of the micrographs in *Ando* are of the surface of columnar carbon deposits from a dc arc discharge. The overall form of the columnar carbon deposits of *Ando* are shown in Figure 1 of *Ando*. These columnar deposits are not at all indicative of a membrane.

Secondly, *Ando* does not teach single-wall carbon nanotubes. The nanotubes of *Ando* appear to be multi-wall carbon nanotubes, as determined by morphology of the nanotubes and the scale in Figure 5(b) of *Ando*. The morphology of the nanotubes in *Ando* shows that the nanotubes are straight and rigid, indicative of multi-wall nanotubes. See Figures 2(c), 2(d) and 3(c) in *Ando*. Furthermore, since multi-wall carbon nanotubes of more than a few layers do not rope together, the nanotubes of *Ando* would expected to be individual multi-wall carbon nanotubes. The large diameter of the nanotubes of *Ando* (i.e. greater than about 4 nm) are also indicative of multi-wall carbon nanotubes. (Note: A scale bar of 1 μm is 1000 nm.)

Thirdly, *Ando* does not teach a membrane that is nanoporous. Applicant respectfully refutes Examiner's contention that the property of nanoporosity is inherent because of the spacing between the tubes. The nanotubes of *Ando* are not in the form of a membrane, but rather large columnar deposits. These large deposits, due to their size, thickness and composition would not be recognized by one skilled in the art to have the property of nanoporosity, even though there is spacing between the tubes.

For inherency to be shown, extrinsic evidence must be presented that makes "clear that the missing descriptive matter is *necessarily* present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268, 20 U.S.P.Q.2d 1746, 1749 (Fed. Cir. 1991) (emphasis added). Inherency cannot be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is legally insufficient. *Id.*, 948 F.2d at 1269, 20 U.S.P.Q.2d at 1749.

Claim 167 depends from Claim 166; thus it too is missing the features absent from *Ando* identified above for Claim 166. Furthermore, with regard to Claim 167, *Ando* does not teach a membrane that is conductive. Conductivity is dependent, upon various factors, including, but not limited to, the composition of the membrane, the orientation of the nanotubes in the membrane and the particular type of carbon nanotubes. *Ando* does not teach a membrane, and, does not teach conductivity of the form of nanotubes in columnar deposits.

With regard to Claim 172, which requires a membrane comprising carbon fibers that are aggregates of a plurality of single-wall carbon nanotubes, wherein the plurality of single-wall carbon nanotubes are in a generally parallel orientation. For the same reasons discussed above, *Ando* does not teach a membrane of aggregates of a plurality of single-wall carbon nanotubes in generally parallel orientation.

Therefore, as a result of the foregoing, Applicant respectfully requests that the Examiner withdraw his rejection of Claims 166, 167 and 172 under 35 U.S.C. § 102(b) as being anticipated by *Ando*.

B. REJECTIONS UNDER 35 U.S.C. § 102(b) AS BEING ANTICIPATED BY *Li*

With regard to Claim 166, *Li* also does not teach a membrane. Figure 4 of *Li* refers to a possible growth model of carbon nanotubes from iron nanoparticles embedded in mesoporous silica. Mesoporous silica is a three-dimensional surface with a large surface area derived from the mesopores. *Li* reports aligned arrays of carbon nanotubes, but not membranes. “The growth direction of the nanotubes may be controlled by the pores from which the nanotubes grow.” See *Li*, Abstract, p. 1701. Thus, *Li* teaches nanotubes growing in all directions throughout and from a three-dimensional porous surface. Thus, *Li* does not teach a membrane, nor does Figure 4 of *Li* illustrate any type of membrane.

Secondly, *Li* does not teach single-wall carbon nanotubes. The nanotubes of *Li* are multi-wall carbon nanotubes. Figure 3 of *Li* states “The tube is well graphitized and consists of about 40 concentric shells of carbon sheets with spacing between the sheets of 0.34 nm. The inner and outer diameters of the tube are 3 and 34, nm, respectively.” Further evidence that *Li* teaches multi-wall nanotubes is found in *Li*, p. 1703, col. 1, par. 1, “The smallest diameter of carbon nanotubes prepared by our method to date is ~ 10 nm.”

Thirdly, *Li* does not teach a membrane that is nanoporous. Applicant respectfully refutes Examiner’s contention that the property of nanoporosity is inherent. The nanotubes of *Li* are not in the form of a membrane, but rather oriented in all directions through and from a three-dimensional mesoporous silica support. These large deposits, due to their size, thickness and composition would not be recognized by one skilled in the art to have the property of nanoporosity, even though there is spacing between the tubes.

Again, Claim 167 depends from Claim 166; thus it too is missing the features absent from *Li* identified above for Claim 166. Furthermore, with regard to Claim 167, *Li* does not teach a membrane that is conductive. Conductivity is dependent, upon various factors, including, but not limited to, the composition of the membrane, the orientation of the nanotubes in the membrane and the particular type of carbon nanotubes. *Li* does not teach a membrane, and, does not teach conductivity of the nanotubes that are in contact with the mesoporous silica support.

With regard to Claim 172, which requires a membrane comprising carbon fibers that are aggregates of a plurality of single-wall carbon nanotubes, wherein the plurality of single-wall carbon nanotubes are in a generally parallel orientation. For the same reasons as discussed above, *Li* does not teach a membrane of aggregates of a plurality of single-wall carbon nanotubes in generally parallel orientation.

Therefore, as a result of the foregoing, Applicant respectfully requests that the Examiner withdraw his rejection of Claims 166, 167 and 172 under 35 U.S.C. § 102(b) as being anticipated by *Li*.

C. REJECTIONS UNDER 35 U.S.C. § 102(b) AS BEING ANTICIPATED BY *THESS*

Regarding *Thess*, *Thess* is not a prior art reference under 35 U.S.C. § 102(b) for Claims 166, 167 or 172. *Thess* was published in *Science* on July 26, 1996, which is less than a year before the effective filing dates for provisional applications containing support for Claims 166, 167 and 172 in the present application, and, therefore, does not constitute prior art for Claims 166, 167 or 172 under 35 U.S.C. § 102(b). The effective filing dates for Claims 166, 167 and 172 in present application is detailed below.

The present Application is the 35 U.S.C. § 371 national application of International Application Number PCT/US98/04513 filed on March 6, 1998. Accordingly, the present Application has a filing date of March 6, 1998. M.P.E.P. § 1893.03(b).

Moreover, the present Application claims priority benefits to the following provisional applications:¹

¹ Applicant notes that in the Declaration and Power of Attorney for Patent Application, dated December 22, 1999 ("the Declaration"), Applicant further listed these six provisional applications for priority purposes. Upon recent review of this Declaration, an error was identified on Page 2, under the heading "Prior United States Application(s)." The Declaration inadvertently referred to a claim for benefit under 35 U.S.C. §120, based upon prior United States Patent Application No. 08/687,665, (now United States Patent 6,183,714 B1) when, in fact, no such priority claim was being made. Accordingly, this Application does not claim priority benefits to Patent Application Serial No. 08/687,665, as originally stated in the Declaration. This error of the Declaration was inadvertent and arose without any deceptive intent. On May 8, 2003, Applicant has submitted a Supplemental Declaration And Power Of Attorney For Patent Application to correct this error.

- (1) Provisional United States Patent Application Serial Number 60/067,325, filed on December 5, 1997;
- (2) Provisional United States Patent Application Serial Number 60/064,531, filed on November 5, 1997;
- (3) Provisional United States Patent Application Serial Number 60/063,675, filed on October 29, 1997;
- (4) Provisional United States Patent Application Serial Number 60/055,037, filed on August 8, 1997;
- (5) Provisional United States Patent Application Serial Number 60/047,854, filed on May 29, 1997("the '854 Application"); and
- (6) Provisional United States Patent Application Serial Number 60/040,152, filed on March 7, 1997 ("the '152 Application").

Claims 166 and 167 in the present Application are supported by the '152 Application. Accordingly, Claims 166 and 167 have an effective filing date of March 7, 1997. 35 U.S.C. §120; *see also* M.P.E.P. § 1893.03(c); *Ralston Purina Co. v. Far-Mar-Co., Inc.*, 772 F.2d 1570, 1575, 227 U.S.P.Q. 177, 179 (Fed. Cir. 1985). Supports Claim 172. The '854 Application. Accordingly, Claim 172 has an effective filing date of at least May 29, 1997. *Id.*

In view of these effective filing dates, *Thess* is not prior art under 35 U.S.C. § 102(b) to Claims 166, 167 and 172 in the present Application.² Applicant respectfully requests that the Examiner withdraw his rejection of Claims 166, 167 and 172 under 35 U.S.C. § 102(b) as being anticipated by *Thess*.

II. REJECTIONS UNDER 35 U.S.C. § 102(e)

Examiner has rejected Claims 166, 167 and 172 under 35 U.S.C. § 102(e) as being anticipated by United States Patent 5,641,466, issued to *Ebbesen et al.* ("Ebbesen"), or United States Patent 6,183,714, issued to *Smalley et al.* ("Smalley"). Paper No. 10, at 4.

² Moreover, *Thess* is also not prior art under any other subsection of 35 U.S.C. § 102. *Thess* was authored by inventors of the present Application.

A. REJECTIONS UNDER 35 U.S.C. § 102(e) AS BEING ANTICIPATED BY *SMALLEY*

Examiner notes that “with regard to *Smalley*, reference is made to Figures 2B-2E for the conductive parallel single-walled carbon nanotubes.” Paper No. 10, at 4.

Examiner contends that it is inherent that “nanotubes in both *Ebbesen* and *Smalley* are nanoporous because of the spacing between the tubes.” Paper No. 10, at 4.

Applicant respectfully traverses these rejections.

With regard to Claim 166, first of all, *Smalley* does not teach a membrane. Figures 2B-2E of *Smalley* refer to ropes of single-wall carbon nanotubes, but not membranes. The ropes of *Smalley* would not be recognized by one skilled in the art as membranes.

Secondly, *Smalley* does not teach a membrane that is nanoporous. Again, Applicant respectfully refutes Examiner’s contention that the property of nanoporosity is inherent. The nanotubes of *Smalley* are not in the form of a membrane, but rather long ropes of aggregated nanotubes.

Again, Claim 167 depends from Claim 166; thus it too is missing the features absent from *Smalley* identified above for Claim 166. Furthermore, with regard to Claim 167, *Smalley* does not teach a membrane that is conductive. Conductivity is dependent, upon various factors, including, but not limited to, the composition of the membrane, the orientation of the nanotubes in the membrane and the particular type of carbon nanotubes

With regard to Claim 172, Claim 172 requires a membrane comprising carbon fibers that are aggregates of a plurality of single-wall carbon nanotubes, wherein the plurality of single-wall carbon nanotubes are in a generally parallel orientation. For the same reasons as discussed above, *Smalley* does not teach a membrane of aggregates of a plurality of single-wall carbon nanotubes in generally parallel orientation.

Therefore, as a result of the foregoing, Applicant respectfully requests that the Examiner withdraw his rejection of Claims 166, 167 and 172 under 35 U.S.C. § 102(e) as being anticipated by *Smalley*.

B. REJECTIONS UNDER 35 U.S.C. § 102(e) AS BEING ANTICIPATED BY *EBBESSEN*

Examiner notes that “Figure 5 of *Ebbesen* depicts the parallel single-wall conductive carbon nanotubes.” Paper No. 10, at 4.

Examiner contends that it is inherent that “nanotubes in both *Ebbesen* and *Smalley* are nanoporous because of the spacing between the tubes.” Paper No. 10, at 4.

Applicant respectfully traverses these rejections.

With regard to Claim 166, first of all, *Ebbesen* does not teach a membrane. Figure 5 of *Ebbesen* refer to a collection of multi-wall carbon nanotubes, but not membranes.

Secondly, *Ebbesen* does not teach single-wall carbon nanotubes. The nanotubes of *Ebbesen* are multi-wall carbon nanotubes. Figure 5 of *Ebbesen*, as well as Figures 3 and 4, show straight, stiff nanotubes that are indicative of multi-wall carbon nanotubes.

Thirdly, *Ebbesen* does not teach parallel nanotubes or an array of nanotubes. Figure 5 of *Ebbesen* appears as collection of multi-wall nanotubes, some of which are perpendicular to each other, but not an array of parallel nanotubes.

Fourthly, *Ebbesen* does not teach a membrane that is nanoporous. Applicant respectfully refutes Examiner’s contention that the property of nanoporosity is inherent. The nanotubes of *Ebbesen* are not in the form of a membrane, but rather an assortment of multi-wall carbon nanotubes. Since the nanotubes of *Ebbesen* are not in the form of a membrane or an array, the property of nanoporosity is not relevant.

Again, Claim 167 depends from Claim 166; thus it too is missing the features absent from *Ebbesen* identified above for Claim 166. Furthermore, with regard to Claim 167, *Ebbesen* does not teach a membrane that is conductive. Conductivity is dependent, upon various factors, including, but not limited to, the composition of the membrane, the orientation of the nanotubes in the membrane and the particular type of carbon nanotubes. Since the nanotubes of *Ebbesen* are not in the form of a membrane or an array, the property of conductivity is not relevant.

Claim 172 requires a membrane comprising carbon fibers that are aggregates of a plurality of single-wall carbon nanotubes, wherein the plurality of single-wall carbon nanotubes are in a generally parallel orientation. For the same reasons as discussed above, *Ebbesen* does

not teach a membrane of aggregates of a plurality of single-wall carbon nanotubes in generally parallel orientation.

Therefore, as a result of the foregoing, Applicant respectfully requests that the Examiner withdraw his rejection of Claims 166, 167 and 172 under 35 U.S.C. § 102(e) as being anticipated by *Ebbesen*.

III. CLAIMS OBJECTED TO

Examiner has objected to Claims 168, 169, 173 and 174. Paper No. 10, at 1. The reasons for these objections were not given; however, Applicant understands the objections were because these claims depended from claims the Examiner was rejecting in Paper No. 10. Applicant has now written claims 168, 169 and 173 in independent form. Claim 174 continues to depend from now independent Claim 173. Thus, the reasons for objecting to these claims has been removed.

IV. TITLE AND ABSTRACT

Examiner has indicated “[t]he Title should be changed to conform with the claimed subject matter.” Paper No. 10, at 4. Accordingly, Applicant has amended the Title of the Application in conformance with such indication. Applicant has similarly amended the Abstract of the present Application also to conform it with the claimed subject matter.

V. CONCLUSION

As a result of the foregoing, it is asserted by Applicant that the Claims in the Application are now in a condition for allowance, and respectfully request allowance of such Claims.

Applicant respectfully requests that the Examiner call Applicant’s attorney at the below listed number if the Examiner believes that such a discussion would be helpful in resolving any remaining problems.

11321-P012USD3

PATENT

Respectfully submitted,

WINSTEAD SECHREST & MINICK P.C.
Attorneys for Applicant

By: 

Ross Spencer Garsson
Reg. No. 38,150

P.O. Box 50784
Dallas, Texas 75201
(512) 370-2870

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memorable (mə-môr'ə-bəl) *adj.* 1. Worthy of being remembered. 2. Remarkable. 3. *memorable occasion* *n.* A noteworthy event. 4. A report, esp. on a scientific subject. 5. *memorable* *n.* The report of the proceedings of a learned society.

mem-o-ra-bil-i-a (mēm'ō-rā-bil'ē-ā, -bil'yā) *pl. n.* [Lat. < *memorabilis*, memorable.] Notable things worthy of remembrance.

mem-o-ra-ble (mēm'ō-rā-bəl) *adj.* [ME < Lat. *memorabilis* < *memorare*, to remember < *memor*, mindful.] Worth being remembered: REMARKABLE < a memorable occasion > — **mem'o-ra-bil-i-ty**, **mem'o-ra-ble-ness** *n.* — **mem'o-ra-bly** *adv.*

mem-o-ran-dum (mēm'ō-rān'dəm) *n., pl. -dums or -da (-də)* [ME < Lat. *memorandum*, to be remembered < *memorare*, to remember. — see MEMORABLE.] 1. A short informal note written as a reminder. 2. A written record or communication, as in a business office. 3. Law. A short written statement outlining the terms of an agreement, transaction, or contract. 4. A business statement made by a consignor about a shipment of goods that may be returned. 5. A brief unsigned diplomatic communication.

me-mo-ri-al (mə-môr'ē-əl, -môr'ē) *n.* [ME < Llat. *memoriale* < *memoria*, belonging to memory < *memoria*, memory. — see MEMORARY.] 1. Something, as a monument or a holiday, designed or established to preserve the memory of a person or event. 2. A petition or written statement of facts presented to a legislative body or an executive. — *adj.* 1. Serving as a remembrance of a person or event. 2. Of, relating to, or in memory. — **me-mo'ri-al-ly** *adv.*

Memorial Day *n.* May 30, a U.S. holiday observed on the last Monday in May in honor of servicemen killed in war.

me-mo-ri-al-ist (mə-môr'ē-əl-ist, -môr'ē) *n.* 1. A writer of memoirs. 2. One who signs or writes a memorial.

me-mo-ri-al-ize (mə-môr'ē-əl-iz', -môr'ē) *vt. -ized, -iz-ing, -iz-es.* 1. To commemorate. 2. To present a memorial to: PETITION. — **me-mo'ri-al-i-za-tion** *n.* — **me-mo'ri-al-iz'er** *n.*

mem-o-rize (mēm'ō-rīz') *vt. -rized, -riz-ing, -riz-es.* To commit to memory. — **mem'o-riz'a-ble** *adj.* — **mem'o-ri-za-tion** *n.* — **mem'o-riz'er** *n.*

mem-o-ry (mēm'ō-rē) *n., pl. -ries.* [ME *memorie* < OFr. *memoire* < Lat. *memoria* < *memor*, mindful.] 1. The mental faculty of retaining and recalling past experience. 2. The act or an instance of remembrance: RECOLLECTION. 3. All that a person can remember. 4. Something remembered. 5. The fact of being remembered: REMEMBRANCE. 6. The time period covered by the remembrance or recollection of a person or group of persons < within the memory of humankind >. 7. Biol. Persistent modification of behavior resulting from the organism's experience. 8. Computer Sci. a. A unit of a computer that stores data for retrieval. b. Capacity for storing information. 9. Statistics. The set of past events affecting a given event in a stochastic process.

memory engram *n.* Engram.

mem-sa-hib (mēm'sā'hib) *n.* [MA'AM + SAHIB.] — Used as a title of respect for a white European woman in colonial India.

men (mēn) *n., pl. of MAN.*

men- *pref. var. of MENO-*

men-ace (mēn'is) *n.* [ME < OFr. < Lat. *minacia* < *minax*, threatening < *minari*, to threaten.] 1. a. A threat < the menace of war >. b. An act of threatening. 2. A vexatious or annoying person. — *v. -aced, -ac-ing, -ac-es.* — *vt.* 1. To threaten. 2. To be a threat to. — *vi.* To make threats. — **men'ac-er** *n.* — **men'ac-ing-ly** *adv.*

men-a-di-one (mēm'ā-dī'ōn) *n.* [ME(THYL) + NA(PHTHA) + DI- + -ONE.] A yellow crystalline powder, $C_{10}H_7CH_3O_2$, with physiological effects similar to vitamin K, used as a medicine and fungicide.

mén-age (mā-nāch') *n.* [Fr. < OFr. *mesnage*, dwelling < Lat. *mansio*. — see MANSION.] 1. Persons living together as a unit: HOUSEHOLD. 2. Household management.

ménage à trois (ā trwā) *n.* [Fr., household for three.] Cohabitation by three people, as a married couple and a lover.

me-nag-er-ie (mə-nāj'ē-rē, mə-nāch'-) *n.* [Fr. *ménagerie* < *ménage*, ménage.] 1. A collection of live wild animals on exhibition. 2. The enclosure in which wild animals are kept.

me-nar-che (mə-nār'kē) *n.* [NLat. : MEN(O) + Gk. *arkhē*, beginning.] The first occurrence of menstruation. — **me-nar'che-al** *adj.*

men-a-zon (mēm'ā-zōn) *n.* [(DI)ME(THYL) + (DIAM)IN(E) + (TRI)AZ(INE) + (THI)ON(ATE).] A colorless crystalline compound, $C_6H_5N_3O_2PS_2$, used as an insecticide.

mend (mēnd) *v. mended, mend-ing, mends.* [ME *menden* < *amenden*, to amend. — see AMEND.] — *vt.* 1. To make right or correct: REPAIR. 2. To improve or reform. — *vi.* 1. a. To improve in health. b. To heal. 2. To correct errors: set right. — *n.* 1. The act of mending. 2. A mended place. — **on the mend**. Improving, esp. in health. — **mend'a-ble** *adj.* — **mend'er** *n.*

men-da-cious (mēn-dā'shəs) *adj.* [Lat. *mendax*, *mendac*, mendacious.] 1. Lying: untruthful < a mendacious person >. 2. Not true: FALSE < a mendacious rumor > — **men-da'cious-ly** *adv.*

men-dac-i-ty (mēn-dās'i-tē) *n.* 1. The state of being mendacious. 2. A lie: falsehood.

men-de-le-vi-um (mēm'dā-lē'vē-əm) *n.* [After Dmitri Mendeleev (1834–1907).] Symbol Md A radioactive transuranium element of the actinide series; atomic number 101; mass number 258.

Men-de-li-an (mēm-dē'lē-ən, -dēl'yən) *adj.* Of or relating to Gregor Mendel or his theories of genetics.

oo boot ou out th thin th this ū cut ūr urge y young
yoo abuse zh vision 3 about, item, edible, gallop, circus